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Haloxerophytization of the vegetation cover of the lower reaches of the Amu Darya in modern conditions

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Introduction

Halophilic vegetation, determined by the unique ecological conditions of saline habitats, has recently, due to the regulation of river flow, begun to spread widely, occupying vast areas of the lower reaches of the Amu Darya. In this regard, for normal development under the conditions of anthropogenic desertification of this region, plants must be not only salt-tolerant, but also drought-resistant. Such properties are possessed by representatives of halophytes, which are most fully adapted to the haloxerophytic conditions of the natural environment of the lower reaches of the Amu Darya. Among them there are many valuable forage plants suitable for phytomelioration of low-productive pastures. The usual habitats of halophytes are soils saline to varying degrees and solonchaks of various genesis, residual, typical and meadow, extensive takyr-like surfaces.

Fig. 1. Tamarix sp. on solonchak soils

Methodology

In this study we used field floristic surveys with the systematic collection and identification of plant species in a key area. These surveys provide baseline data on xerophitic plant diversity, which is crucial for conservation planning and ecological studies. In the study area we used transect s ampling, traditional for arid landscapes quadrat aampling, and also plotless sampling technique combined with GNSS georeferencing, soil sampling and picture taking. Also we built vegetation maps to depict the distribution of different vegetation types. This had been done through field surveys combined with cartographic techniques.

Results and Discussion

In recent times, violations of the technology of cultivating agricultural crops have led to the development of secondary salinization processes, which by 2010 covered more than 70% of irrigated lands. In this regard, irrigated arable lands degrade over time, their fertility decreases, salinization and desertification occur. The deterioration of ecological and reclamation conditions of the Amu Darya delta is the main reason for the conversion of lands into fallow lands. The deposits are dominated by hyperhalophytes (Halocnemum strobilaceum, Halostachys belangeria, etc), and annual saltwort communities (Suaeda acuminata, Saltissima, Climacoptera aralensis) are also noted. The deposits contain sparse groups of ephemeral comb-like plants (Tamarix laxa, Lepidium perfoliatum) and saltwater grasslands (Halostachys belangeriana). Therefore, measures to increase the productivity and sustainability of the ecosystems of the Amu Darya delta, capable of counteracting several factors of degradation of the natural system at once, occupy a paramount place. The issues of restoring and increasing the productivity of degraded lands of the Amu Darya delta, due to their environmental focus, are becoming particularly relevant. These scientific and practical studies, providing experimental justification for the development of techniques and measures to improve the sustainability of agricultural land in the Amu Darya delta, are of significant importance.

Under above-mentioned conditions, halophytic succession on the modern territory of the Amu Darya delta mainly on saline sediments of heavy mechanical composition, which went through a number of stages from hydromorphic plant communities to xerophytic semi-shrub and shrub communities. Accepting the thesis of edaphic climax, plant communities of automorphic habitats will be zonal. Sarsazan and carabara phytocenoses, located in the hydromorphic conditions of sor depressions, should be considered as ecological relics. The meadow-salt marsh variant of the formation of coastal vegetation is not a stage of haloseria, because develops on heterogeneous sediments. It occupies certain positions in space and indicates the heterogeneity of soil conditions.

Fig. 2. Halostachys on a salinized soil

Conclusions

Thus, in conclusion, it should be noted that the halo series of vegetation cover in the lower reaches of the Amu Darya is a succession, the development of which follows a tolerance model under conditions of changes in the water-salt regime of soils and the redistribution of salts along the soil profile.

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